Q Fever Infection: An Overview of Public Health Response

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Q Fever

- Caused by the bacteria *Coxiella burnetii*
- Very hardy in the environment
- Replicates to high numbers in the placenta and reproductive tissues of infected animals
- Also shed in the urine, feces, and milk
- Sheep, goats, and cattle are the main source of infection for people
Q Fever: Human Statistics

- Became nationally notifiable in 1999
- Cases are more commonly reported from western states and the CDC reports between 150-200 human cases/year

Annual reported incidence (per million population) for Q Fever in the United States for 2010, CDC

Figure 3 - Annual reported incidence (per million population) for Q Fever in the United States for 2010.
Q Fever: Transmission to People

• Inhalation of infectious aerosols is the most common mode
  – directly from birth fluids of infected animals or via inhalation of dust contaminated with dried birth fluids or excreta
  – birth assistance, exposure to birth materials

• Other transmission methods (e.g., tick bites, consumption of raw dairy products, person to person) are rarely reported
Q Fever: Human Illness

- Some exposed remain asymptomatic
- Incubation 2-3 weeks for acute illness
- Acute and chronic forms
- Acute illness:
  - Flu-like symptoms (e.g., high fever, severe headache, muscle aches, cough) most common
  - Pneumonia of varying severity
  - More severe symptoms like meningitis and heart problems are uncommon
Q Fever: Human Illness

- Post-Q Fever fatigue syndrome
  - Majority of acute Q Fever patients recover completely
  - Fatigue syndrome has been reported in 20-42% of acute cases
  - Previously healthy people with no pre-existing conditions who develop a complex of symptoms dominated by debilitating fatigue
Q Fever: Human Illness

• Chronic illness
  – Occurs in <5% of infected patients
  – Can occur months or years after initial infection
  – Can manifest as endocarditis, hepatitis, chronic vascular, bone or lung infections
  – Those at highest risk include people with pre-existing heart conditions like heart valve disease
Q Fever: Human Illness

• Special populations
  – Children
  – Pregnant women
  – Immune compromised
Q Fever: Animal Illness

• Primary reservoirs (cattle, sheep and goats) are typically asymptomatic

• When clinical illness is seen:
  – Goats and sheep: abortion, stillbirth, weak kids/lambs
  – Cattle: abortion, low birth weight calves, subclinical mastitis, metritis

• Studies in cats would indicate adverse reproductive events in this species as well
Q Fever: Animal Transmission

• Inhalation of infectious aerosols and/or direct contact with infected and contaminated environments
  – Birth products, excreta and milk are the most likely sources of infection
  – Ticks may also serve as a route of infection
Q Fever Outbreaks: Human

- Q Fever outbreak in the Netherlands
  - Outbreak spanned 2007-10
  - Peak in 2009
  - Over 4000 human cases

Q Fever Outbreaks: Human

• Proximity to aborting small ruminants probably main cause
• Q Fever abortions registered in 30 dairy goat and dairy sheep farms between 2005-2009

Dijkstra, et al, Immunology and Medical Microbiology, (64) 2012, 3-12
Q Fever Outbreaks: Human

• Outbreak Associated with Goat Farms --- Washington and Montana, 2011
  – First reported multistate Q Fever outbreak in US
  – Q Fever detected in a placenta from a goat on a Washington farm in April
  – Abortions in goats had been ongoing since January
  – Ill people identified in May
  – 15 ill people, 4 hospitalized
Q Fever Committee

• Formed in January 2012
• Joint leadership of the National Association of State Public Health Veterinarians (NASPHV) and the National Assembly of State Animal Health Officials (NASAHO)
Committee Goal

• To provide recommendations for a coordinated public and animal health response to Q fever outbreaks
• Serve as a guide to public health officials, animal health officials, clinical veterinarians and physicians
Committee Members

- Alicia Anderson, Centers for Disease Control and Prevention
- Tom Boyer, American Goat Federation
- Ann Garvey*, NASPHV
- Katherine Marshall, USDA
- Paula Menzies, University of Guelph
- Julia Murphy, NASPHV
- Paul Plummer, Iowa State University
- Gatz Riddel, American Association of Bovine Practitioners
- Paul Rodgers, American Sheep Industry
- Joni Scheftel, NASPHV
- Tahnee Szymanski*, NASAHO

Available on NASPHV website:

Content

• Background information on *C. burnetii* infection in humans and animals
  • Epidemiology, Clinical presentation, Testing methods and interpretation, Treatment and monitoring, Controlling transmission
• Joint public health and animal health investigation and response
• Recommendation for future action
• Appendices
Public Health Response

• Interview human Q fever cases for illness and exposure history
• Identify people in contact with or potentially exposed, through aerosol transmission, to animals with suspected or confirmed coxiellosis
• Discuss with animal owners/caretakers
  • Risks, Routes of transmission, Preventing additional human exposure, Need for medical attention should symptoms develop
Public Health Response

- Alert health care providers and medical clinics in surrounding areas
- Provide guidance to healthcare providers on diagnostic testing options, test results interpretation, and treatment
- In partnership with animal health officials, provide outbreak information to media outlets and stakeholders as appropriate
- Perform epidemiological analysis to characterize case demographics and to identify risk factors associated with human illness
Animal Health Response

- Perform on-site investigation
  Collect:
  - Species and number of animals on premises
  - Animal management practices
- Contact herd/flock veterinarian
  - Diagnostic testing
  - Treatment considerations
Animal Health Response

• Discuss with the animal owner and herd/flock veterinarian:
  • Human and animal illness
  • Persons at higher risk for complications
  • Routes of transmission
  • Measures to prevent human exposure
  • Need to seek medical attention should symptoms develop
Animal Health Response

- Alert veterinarians in surrounding areas
- In partnership with public health officials, provide outbreak information to media outlets and stakeholders as appropriate
- Perform epidemiological analysis to characterize outbreak animal health demographics and to identify risk factors associated with the identification of coxiellosis in animals in a premises
Appendices

• Q Fever Interview Template
• Q Fever Factsheet
• PPE for Animal Owners and Caretakers
• Human Case Definition
• Healthcare Provider and Veterinary Alerts
• Coxiellosis Diagnostics and Interpretation for Veterinarians
• Manure Management and Carcass Disposal Considerations
References

• Diagnosis and Management of Q Fever — United States, 2013, Recommendations from CDC and the Q Fever Working Group
  – http://www.cdc.gov/qfever/

• Evaluation of Factors that Would Initiate or Propagate Epidemic Coxiellosis in the U.S. Domesticated Goat Population
Acknowledgements

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